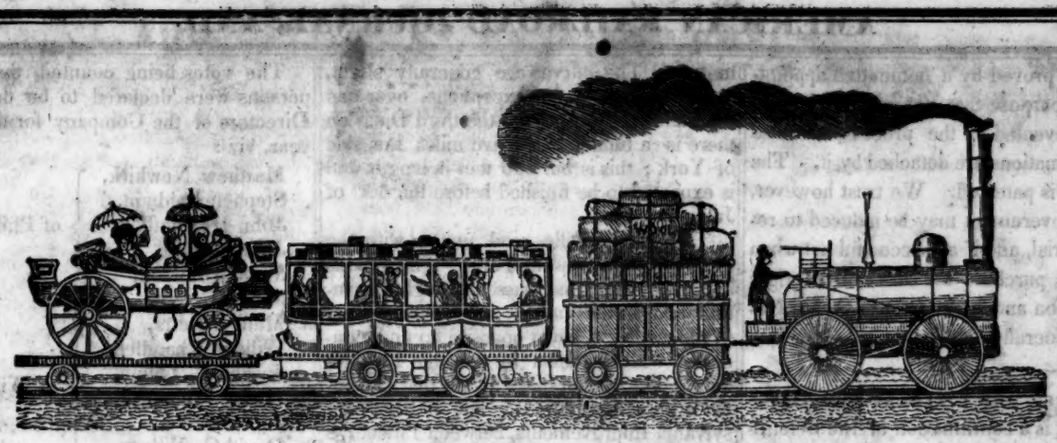

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JANUARY 21, 1837. [VOLUME VI—No. 3

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 21, 1836.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid since the 25th December, 1836.

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A TREATISE ON THE PRINCIPAL MATHEMATICAL INSTRUMENTS, EMPLOYED IN SURVEYING, LEVELLING, AND ASTRONOMY, explaining their construction, adjustments, and use, with tables, by T. W. SIMMS, Assistant at the Royal Observatory, Greenwich. Revised with additions by J. H. ALEXANDER, Civil Engineer—F. Lucas, Jr., Baltimore. An American edition of an English work, written by a gentleman well versed in the scientific and practical knowledge of Instruments.

The principles of the construction of the instruments are clearly explained, aided by very good cuts—and the details of their adjustment, are very well described.

The latter subjects are followed out at length as regards both Surveying and Astronomical Instruments.

The value of the work is also increased, by the Tables at the end—they are of great use to Engineers, Surveyors, and Astronomers.

The portability of the work is a great recommendation, and the information added in the American Edition, being suited to the practice of the profession in this country, it will be found one of the most useful and convenient works that an Engineer can use.

While on this subject, we must remark, that the principles of construction and adjustment of many of the most commonly used Surveying Instruments, are far from being well understood. Mistakes of the most glaring nature have come under our own observation, and in persons otherwise thoroughly understanding their instruments.

Instruments are also very liable to get out of order while in use, and that too in places where an instrument maker would be a *rara avis*. To all persons in such a predicament, a slight knowledge of the principles of construction of their instruments will be invaluable.

We know of no work more useful in all such emergencies, than this treatise of Mr. Simms.

Extract from a file of the "Journal des Debats" kept at the reading rooms of the "Young Men's Association" in the city of Albany. Nov. 5, 1836. From Correspondent.

"Monsieur Chaix a Frenchman by birth, and long a resident of the Island of France, has made a discovery of great interest to Steam Navigation. The boilers of Engines, as is generally known, are after a short use covered internally with a hard crust, principally composed of calcareous substance, which prevent the transmission of heat from the furnace, to the water contained in the boilers; increases the already heavy expense of fuel, and often causes the formation of fissures and cracks which require costly repairs. M. Chaix has discovered a means as simple as it is ingenious to prevent the formations of these incrustations. His process has been tested by order of the Navy Commissioners at Toulon on board the Government Steamboat *Phare*.—

It has been proved by a committee appointed for the purpose that not only are incrustations prevented by the process, but also that old formations are detached by it. The discovery is patented. We trust however, that our Government may be induced to repeat the trial, and if as successful as when first tested, purchase the discoverers right for the nation and the interest of Steam Navigation generally."

SCIENTIFIC AND LITERARY JOURNAL.—This work is a continuation of the Scientific Tracts, so well known for neatness of execution and value of matter. The new and enlarged form of the work will retain the same character.

We are indebted to several gentlemen for Reports. These will appear in due course.

Also, to the Hon. Gideon Lee, for public Documents.

☞ The Brooklyn and Jamaica Railroad Company have made a dividend of $2 per share.

BALTIMORE AND SUSQUEHANNA RAILROAD.

In Wednesday's paper, we spoke of a memorial from the President and Directors of this important work, praying aid from the State, and mentioned that their application was made in reference to the construction of the Wrightsville road, which is a continuation of the Susquehanna road. We have since been furnished with the following particulars which we lay before our readers.

It will be recollected that two years ago, a similar application was made, and, in view of the importance of this work, the appropriation was immediately granted. This sum would have been amply sufficient, had it not been for the unexampled rise in the price of materials, provisions and labor. Notwithstanding this difficulty the company have presevered with a zeal worthy of all commendation.

After a careful examination of the various routes, the present line was adopted and this line strikes the Gunpowder about half a mile above Tyson's mill, continues along the right bank of this stream as far as the "Forks;" then follows the North branch as far as its junction with the Bee Tree Run, leaves this last stream at its source, and follows the Codorus to York.

As soon as the different divisions were located, they were put under contract; the 1st division is completed; the 2nd is two-thirds finished; the 3rd division is in active progres and, from present appearances, will not be far behind the others.

We see by the advertisement that the rails will be laid next spring. These rails are of a superior quality. Their great solidity will make them last much longer then the ordinary rail. The grades on this road are mostly of a gentle character. In no case will they offer a serious obsaacte to the locomotive. The curves are generaly slight, being with but a few exceptions, over one thousand feet radius. On the third Diwivion there is a tunnel, about five miles this side of York; this is but 250 feet in length, and is expected to be finished before the 4th of July.

The Wrightsville road unites with the Susquehannah road at York. This road is about 11½ miles long passes through a beautiful and fertile valley, and terminates at Wrightsville, a town opposite to and connected with Columbia by a bridge 1¼ miles long. Our readers are aware that Columbia is immediately on the line of the Pennsylvania Improvements, between Pittsburgh and Philadelphia, being connected with Philadelphia by a Railroad, and with Pittsburg by Canal and Railroad. The distance between York and Baltimore is 56½ miles, from York to Columbia 13 miles, making the distance between Baltimore and Columbia 69½ miles, about 13 miles less than the distance between Philadelphia and Columbia, and consequently making Baltimore so much nearer Pittsburg than Philadelphia. Two-thirds of the Wrightsville road is in a straight line, the curves in the remainder have probably an average radius of from four to five thousand feet—the road being in a valley has very gentle grades. Five-sixths of this road is completed.

A road is about being constructed between York and Gettysburg. This work and others about to be undertaken by Pennsylvania, will render the completion of the road from Baltimore to Columbia highly advantageous to the interests of Baltimore. There are the strongest reasons to expect that this demand will meet with success. We know that the road is nearly completed, that on its completion depends much of the future prosperity of Baltimore; and when we take into consideration the giant effort of Pennsylvania and New-York to wrest from us the western trade, we cannot doubt that our Legislature will appreciate the necessity of affording such aid as may enable us to realize the advantages expected from this great work.—[Chronicle.]

WILMINGTON AND SUSQUEHANNA RAILROAD COMPANY.

At an annual meeting of the Stockholders of the said Company, convened at their office in Wilmington, on Monday the 9th day of January, 1837.

John Andrews, Esq., of Philadelphia, was called to the Chair, and Harry Connelly was appointed Secretary.

The annual report of the Directors of the progress of the work, with the report of the Chief Engineer, was read, and

On motion of Mathew Newkirk, Esq., Resolved, That the said report be and is hereby accepted, and ordered to be published.

On motion, the Stockholders then proceeded to the election of Directors, to serve the ensuing year.

The election was conducted by John Connell, Esq., of Philadelphia, and Thomas C. Alrichs, Judges appointed by the Board of Directors from among the Stockholders. Messrs. Allan Thomson and Jonathan Bonney appointed tellers.

The votes being counted, the following persons were declared to be duly elected Directors of the Company for the ensuing year, viz:

Matthew Newkirk,
Stephen Baldwin,
John Hemphill,
John Connell,
Samuel Jaudon,
} of Philadelphia.

James Canby,
Mahlon Betts,
William Chandler,
Joseph C. Gilpin,
Henry Whiteley,
James Price,
David C. Wilson,
James A. Bayard,
} of Wilmington.

James Sewall, of Elkton,
J. J. Cohen, Jr., of Baltimore.

The meeting then adjourned.

J. ANDREWS, Chairman.
Attest, HARRY CONNELLY, Sec'y.

The Directors assembled on the same day, and James Canby, Esq., was unanimously re-elected President of the Board.

W. P. BROBSON, Secretary.

A meeting of the citizens of Rochester was held on the 30th ult., at which resolutions were passed in favor of *raising a loan* to carry on the proposed enlargement of the Erie canal, and of petitioning the Legislature to pass a law for that purpose. In pursuance of a suggestion of the citizens of Buffalo, a convention of delegates, from all the counties particularly interested in the matter, is invited to assemble at Rochester on the 18th inst.

The railroad from Mobile to Cedar Point, at the south-west entrance of Mobile Bay, is likely to progress with rapidity.—contracts being made and part materials ready.

Some work of this kind is essential for the commerce of Mobile, as the bay is gradually becoming shallower; and will shortly be little better than a pond, in consequence of the numerous and extensive bars formed by the alluvion deposits. Large ships have had consequently to anchor in the Gulf, near where its junction with the bay forms a large bar: and the trouble and expense of lighterage have consequently been very great. But as the projected railroad may have proper baggage cars for the conveyance of cargoes, a port with wharves may be formed at Cedar Point, for the trade of Mobile, but Mobile itself can never be a maritime town of note. —[N. O. Standard.]

CHICAGO AND GALENA RAILROAD. *James Seymour, Esq.*, Chief Engineer on this Road, has arrived in town, and is ready to commence operations as soon as the necessary action is had by the Board of Directors. Mr. Seymour has been long engaged on some of the principal public works at the East, and is every way competent to superintend the work now about to be placed under his charge. We congratulate our citizens on the present prospect of the immediate commencement and completion of this Road. [Chicago Am.]

ANNUAL REPORT OF THE COMMISSIONERS OF THE CANL FUND.

The report of the Commissioners of the Canal Fund was made to the Assembly on the 4th inst.

This report states that the surplus moneys in the hands of the Commissioners, 30th September, 1835, at $3,406,809 72
Received by the Commissioners for the year ending 30th September, 1836, 1,941,930 66

Total to be accounted for by the Commissioners, $5,348,740 38

This sum is accounted for as follows, viz:

Paid for interest on Canal Debt,	$208,391	82
Paid for Canal Stock,	685,735	60
To superintendents of repairs,	300,391	32
To Canal Commissioners,	66,259	82
To weigh masters,	4,211	20
Miscellaneous expenses,	17,397	69
	$1,282,386	45
Balance in the hands of the Commissioners, 30th September, 1836,	$4,066,353	93
Of this balance there is invested in 5 per cent. State stock,	183,933	59
Five per cent. loan to city of Albany,	150,000	00
Loaned to sundry banks at 5 per cent.,	1,897,636	22
Do. at 4½ per cent.,	1,600,325	69
Do. at 3½ per cent.,	101,504	16
Loan to Chenango Canal at 5 per cent.,	132,954	27
	$4,066,353	93

RECEIPTS AND EXPENDITURES FOR THE YEAR.

The actual amount of revenue of the Erie and Champlain Canal Fund, received from all sources, from the 30th September, 1835, to the 30th September, 1836, is as follows, viz:

Amount received for tolls, after deducting expenses of collection,	$1,513,271	85
Vendue duty,	187,194	20
Salt duty,	64,763	46
Interest on other investments,	13,645,	20
Sales of lands,	2,218	05
Rents of surplus waters	2,511	00
Miscellaneous receipts,	1,688	06
	$1,947,483	61

The amount actually expended during the year, is as follows, viz:

For interest on Canal Debt,	$208,391	82
Repairs of the Canals by superintendents,	300,391	32
Expenditures by Canal Commissioners,	66,250	82
Salaries of weigh-masters,	4,211	20
Printing for Canals,	3,394	90
Tolls refunded,	5,728	02
Costs of suits,	134	54
Ballances of Collectors' accounts,	307	72
Paid to proprietors of Albany Basin, for their proportion of tolls of 1835,	3,885	75
To John Tracy, Lieutenant Governor, for attendance as Commissioner of the Canal Fund,	253	20
To Samuel Young, for attendance as Canal Commissioner,	206	85
To appraisers of damages,	507	00
To Holmes Hutchinson, for canal maps, per chapter 58, laws of 1836,	2,545	00
To George W. Newell, second deputy comptroller, Canal Department, for salary,	1,500	00
Miscellaneous payments,	7,768	51
	$605,548	65
Leaving the nett revenue of the Erie and Champlain Canal Fund, after paying all charges upon it, at	$1,341,934	96
The Commissioners esitmate the income of the fund for the current year at	$1,595,691	67
And the expenditures at	1,188,400	00
Estimated surplus for the current year,	$407,291	67

PAYMENT OF CANAL DEBT.

The outsanding stock on the 30th of September, 1835, amounts to the sum of	$4,227,709	19
Redeemed during the fiscal year ending 30th Sept. 1836,	645,206	46
Leaving unredeemed, 30th September, 1836,	$3,582,502	73

A sum sufficient for the redemption of this stock, was collected previous to the 1st of July last; but as the receipts for tolls and salt duty for the month of June, by an arrangement with the collecting banks were not payable until the 16th of July, the amount of these receipts could not be invested for the payment of the canal debt, until the latter period.

On the 18th of July, the whole amount necessary for the extinguishment of the canal debt had been collected and invested; and on the 30th of that month a meeting of the Commissioners of the Canal Fund was held, at which the following statements, made out from the Canal Fund Books, were presented to the Board. viz:

1. A statement of the amount outstanding on the 18th July, 1836, of the several kinds of stock, issued for the construction of the Erie and Champlain Canals, the amount of interest annually payable on said stock, and the time when the principal is reimbursable, viz:

5 per cts. reimbursable 1st July, 1837,	$700,648 55	Annual interest. $35,032 42
5 per cts. "	779,263 06	46,755 78
5 per cts. "	1,753,252 22	87,664 61
5 per cts. "	529,052 62	31,743 15
	$3,762,256 49	$201,195 96

2. A statement of the investments of the Erie and Champlain Canal Fund moneys, as the same were on the 18th of July, 1836, and of which the following is a summary, viz:

		Annual interest.
Amount in general deposite banks in Albany, at 3½ per cent.,	$69,168 47	$2,420 89
Deposites in collecting banks at 4½ per cent.,	727,609 51	32,742 42
On loan at 4½ per cent.,	952,784 38	42,875 29
On loan at 5 per cent.,	706,000 00	35,300 00
On loan til 1st July, 1837, at 5 per cent.,	1,141,636 22	57,081 81
In Stocks and Bonds, at 5 per cent.,	333,933 59	16,696 67
	$3,931,132 17	$187,117 08

It is shown by these statements, that the annual interest required to be paid on the outstanding stock, exceeds, by $14,078 88, the amount of interest receivable annually on the funds invested. After the 1st of July, 1837, interest will cease on $1,350,000 of the debt: and although the surplus fund will be diminished by the withdrawal of this amount from the capital invested, yet after the 1st of July, the interest receivable on the investment will more than equal the interest payable on the stock of 1845, if the rate of interest on the sum invested continues at 5 per cent.

The amount of capital invested, it will be seen, exceeds the amout of the principal of the canal debt by the sum of $168,875 68. There is therefore a sufficient provision made for any deficiency that may arise from a diminution of the rate of interest on the moneys invested; and in addition to this, the public creditor has a certain resource against any casulty that may impair the capital invested, in the ample revenues from the tolls of the canals, which are still pledged by the constitution for the final payment of all moneys borrowed for the construction of the Erie and Champlain canals.

The amendment to the constitution, which was ratified in 1835, provides, that whenever a sufficient amount shall have been collected and invested, to reimburse the money borrowed for the construction of the Erie and Champlain Canals, the auction an salt duties shall be restored to the general fund. Since the 18th of July, therefore, the monies received into the Treasury on account of the auction and salt duties, have not been paid over to the Commissioners of the Canal Fund, but have remained in the Treasury for the use of the General Fund. The Canal Fund will hereafter be deprived of these two items of revenue, which will diminish the annual resources of the fund about $350,000. The auction and salt duties were transferred from the General Fund to the Canal Fund by the act of 1817, which provided for the commencement of our system of internal improvement; and during a pe-

riod of nearly twenty years, these sources of the revenue have yielded to that fund the sum of $5,647,497 11, being $392,626 41 more than the whole sum paid for interest from 1817 to the 30th of September, 1836, on all the money borrowed for the construction of the Erie and Champlain canals.

The expenditures which have been authorised for doubling the locks and enlarging the Erie canal, and the loans which are authorised to be made to the General Fund, will prevent any future accumulation of the surplus Canal Fund moneys beyond the sum invested for the payment of the canal debt.

The Erie and Champlain canals were finished in 1825; and in 1826, arrangements were made for obtaining interest from the banks on the surplus deposites of the Canal Fund. The rapid accumulation of the deposites in the banks, and the probability that the amount might be increased to six or eignt millions of dollars before any portion of the canal debt become payable, occasioned much solicitue; and the Commissioners finally determined to apply the funds in the banks to the purchase of the stock, by paying a premium for it.

This measure was adopted in January, 1833, when the surplus money in the hands of the Commissioners amounted to more than three millions of dollars, and the outstanding debt to $7,000,135 86; of which debt, the sum of $3,489,000 was payable on the 1st of July, 1837.

The Commissioners were so strongly impressed with the importance of applying the surplus funds to the payment of the canal debt, as stated in the annual report of 1834, that they determined to redeem the stock whenever it could be obtained on such terms as would render the purchase equal to an investment at an interest of 3½ or 4 per cent. One of the reasons assigned for this measure in the same report was, that the State, in making a small apparent sacrifice to effect this object, "gets rid of the hazard incident to the management of three or four millions of dollars; and by gradually possessing itself the stock of 1837, the serious pressure upon atl the monied operations of the State will be avoided, which might result from allowing the Canal Fund moneys to accumulate in the State banks—to be diffused by them through every department of business—and then to be drawn for on the first of July, 1837, to the amount of three and a half millions of dollars for the redemption of the stock then payable.

If this course had not been adopted, the accumulations of the surplus deposited in the banks would have amounted, at the close of the year for which this report is made, to seven millions and a half of dollars, besides the investments in stocks. And if the sum of three millions six hundred and seventy-three thousand dollars, which has been drawn from the banks and applied to the payment of the canal debt, had remained in those institutions, an expansion of the credit system, beyond that which is now experienced, based upon the deposite of this money, would have been the natural consequence; and with the present indications in England relative to investments of capital in the United States, there is every reason to suppose that a large portion of the original stock of 1837, two-thirds of which is held in England, would have been returned for redemption on the first of July next, the payment of which, by drafts upon the banks, must have produced considerable embarrassment in every branch of business which is dependent upon them for money facilities.

The amount of stock redeemed during the last four years, is as follows, viz:

	Stock.	Premium.	Total paid.
1833,	$1,478,376 57	$87,933 45	$1,566,310 03
1834,	588,006 61	50,823 48	638,830 06
1835,	706,943 49	70,217 09	782,160 58
1836,	645,476 46	40,259 14	685,735 60
	$3,418,802 13	$254,233 14	$3,673,036 27

Of the stock redeemed as given above, the sum of $2,136,524 37 was reimbursable in 1837, and the sum of $1,281,278 76 was reimbursable in 1845. It was shown by the annual report of 1833, page 40, that the total amount of stock then outstanding, and reimbursable on the 1st of July, 1837, was $3,489,000 00

Deduct amount of stock redeemed since, 2,136,524 57

And it reduces the sum payable in 1837, to $1,352,475 63

It is probable that one-third of this stock will be returned for redemption, between the close of the fiscal year and the first of July, 1837. And if the whole of the residue should be presented for redemption on the first of July, the arrangements which have been made to draw the amount required ratably from a capital of nearly four millions of dollars, distributed among fifty-six banks, will enable the Commissioners to cancel the debt of 1837, without inconvenience to the business operations of the state, or the banks which have the surplus Canal Funds in deposite.

Management of the Canal Fund Moneys.

In the annual reports for 1833 and 1835, the measures adopted by the Commissioners with a view to the profitable investment of the surplus Canal Fund Moneys, are fully detailed. To those reports the legislature is respectfully referred for a history of the management of these moneys from 1826, when the surplus began to accumulate until 1835.

The amount received annually for interest on the moneys deposited in the bank for eleven years, is as follows, viz:

Received for interest on deposites in		1826	$4,515 40
do	do	1827	4,987 96
do	do	1828	7,281 20
do	do	1829	7,576 30
do	do	1830	24,000 17
do	do	1831	35,710 31
do	do	1832	84,619 15
do	do	1833	122,236 74
do	do	1834	117,092 00
do	do	1835	148,289 62
do	do	1836	162,176 32
			$718,476 17

In addition to the interest paid by the banks, as given above, there has been received for interest on investments in stocks, the sum of $124,699 85:—Thus showing that the Canal Fund has been increased by the interest on the deposite and loan of surplus, to the amount of $843,176 03. It is estimated that the receipts from interest on the surplus moneys for the ensuing year will amount to the sum of $187,000.

To enable such of the Banks in the city of New-York as held Canal Fund deposites, to avail themselves of the provisions of a law passed at the last session of the legislature, which authorised them to use loans for twelve months as capital, the Commissioners offered to all the banks an extension of their loans to the 1st of July, 1827, on condition that the rate of interest should be raised to 5 per cent. The banks generally acceded to thi s proposition, and several new loans were made to the banks in the city of New-York on the same terms.

On the 19th of September, the Comptroller issued a circular to the cashiers of the several banks which have the Canal Fund moneys in deposite, showing the amount of the outstanding canal stock, the time of its redemption, the condition of the moneys provided for its reimbursement, and the drafts which might be made upon the 4½ per cent. deposites during the current year, and offering to draw ratably upon all the banks, providing those holding loans and deposites at 4½ per cent., would thereafter pay interest at the rate of 5 per cent. A copy of the circular is appended to this report, and marked W. Most of the banks have acceded to the terms proposed in the circular, and have executed agreements to pay interest at the rate of 5 per cent., commencing on the 1st of October, 1836. The whole amount of the surplus on loan at 5 per cent. on that day, it is ascertained will be $3,220,000. Add to this sum invested in 5 per cent. State stock, and a 5 per cent. loan to the city of Albany, amounting together to $333,933 59, and it will show a total investment at 5 per cent., of $3,554,369 81

The total sum invested at 5 per cent., as shown by the last annual report, was 1,099,833 59

Increase of investments at 5 per cent., for the year, $2,451,736 22

The final redemption of the Erie and Champlain Canal debt being now provided for, the occasion is embraced to present a condensed view of the operation of the system of finance which was adopted in the act of 1817, "respecting navigable communications between the great western and northern lakes of the Atlantic Ocean;" and by means of which system, the necessary sums have been provided, not only for all the current disbursements connected with the canals, but also to reimburse the whole of the debt contracted for the construction of the Erie and Champlain Canals, nine years sooner than the period fixed for the payment of the second or last instalment of the canal debt. A table had been prepared and is annexed, marked U, which shows the amount of money received by the Commissioners of the Canal Fund, and the source of the revenue, for a period of 20 years, and also shows the payments for the same period, and the objects to which the moneys were applied. The table referred to presents the following results, viz:

Received by the Commissioners from 1817 to 1836.

Avails of loans exclusive of premiums,	$7,672,782	24
Premium on loans,	223,308	76
Tolls,	12,489,220	33
Vendue duty,	3,592,039	05
Salt duty,	2,055,458	06
Steamboat tax,	73,509	99
Sales of lands,	99,932	20
Interest on investment of surplus,	846,532	04
Rent of surplus water,	16,532	68
Other receipts,	28,307	90
	$27,097,683	25

Paid by the Commissioners.

To Canal Commissioners,	$9,977,944	30
For interest,	5,254,878	70
Western inland and lock navigation company,	155,718	52
Notes of Myron Holley,	17,155	91
Miscellaneous payments,	185,922	70
Superintendants of canal repairs,	3,019,146	79
Extinguishment of canal debt,	4,423,571	40
	$23,041,329	32
Balance in the hands of the Commissioners, 30th September, 1836,	$4,066,353	93

The act of 1817, which created the Board of Commissioners of the Canal Fund, and authorised money to be borrowed for the construction of the Erie and Champlain canals, expressly set apart and pledged for the payment of interest and reimbursement of the principal of the money borrowed, the auction and salt duties, a tax on steamboat passengers, and all the tolls to be derived from the canals. The sanction of the Constitution of 1821 was added to this pledge, and in it the Legislature was prohibited from selling any of the works from which the Canal Fund revenues were derived, or reducing those revenues below a fixed standard, or diverting any portion thereof from the original object for which they had been set apart.

With a system of finance thus wisely arranged and strongly guarded, nothing could prevent the prosperous result which its founders anticipated, if the plan was followed out by a judicious system for the collection, safe keeping, and faithful application of the ample revenue which had been provided. In this particular, the interest of the Canal Fund has been protected with unexampled success; and the intentions of its establishment, thus far, have been fully carried out. Since the present system for the collection of tolls was put in operation, in 1826, there has been collected and paid into the treasury, by the numerous agents on 435 miles of canal, (including the tolls of 1836, not embraced in the preceding statement,) about thirteen millions and a half of dollars, without the loss to the fund, by the defalcation or misconduct of the collecting agents, of a single dollar. During the same period there has been applied to the payment of, the sum of $1,423,571 40, and the sum of $3,931,132 17 has been collected and set apart for the final extinguishment of all the outstanding debt

Oswego Canal.

Paid for repairs and interest on debt	78,172	34
Receipt for tolls and lands,	34,229	37
Deficiency drawn from the treasury,	$43,942	97

Cayuga and Seneca Canal.

Paid for repairs and interest,	38,201	78
Received for tolls,	18,539	08
Deficiency paid from the treasury,	$19,662	70

Chemung Canal,

Paid for repairs and interest on debt,	25,423	19
Received for tolls,	4,315	49
Beficiency paid from the treasury,	$21,107	70

Crooked Lake Canal.

Paid for repairs and interest on debt,	11,332	93
Received for tolls,	1,528	65
Deficiency paid from the treasury,	$9,794	28

Chenango Canal.

Balance in hands of Commissioner, 30th September, 1835,	$177,872	21
Received from loans during the year ending 30th Sept. 1836,	799,029	60
	$970,961	81
Paid in constructing canal,	911,035	10
For interest on debt,	65,637	81
Advertising for loans,	228	90
	$976,901	08

On the 16th of August the Commissioners advertisied for a loan of $470,000, being the residue of the amount which they were authorised to borrow for the completion of the Chenango canal. The 31st of August was the day designated for opening the proposals for this loan, but not a single offer was received, and the Commissioners were net able to negociate a loan for the whole or any part of the sum required, at par, on a 5 per cent. stock, reimbursable after the year 1845.

The condition of the money market in England, and the indications there of a disposition to discountenance investments in American stocks, had the effect to deter bidders from taking the loan: and this is readily explained by the fact that four-fifths of the loans for the Erie and Champlain Canal Fund are held in England.

Of the loans subsequently made, it is believed that four-fifths of the whole amount is held in England. If this state of things in regard to the money market continues, it may become necessary, in order to obtain money, to issue a 6 per cent stock. And it is respectfully submitted to the consideration of the legislature, whether discretionary authority shall be given to the Commissioners of the Canal Fund, to issue a stock bearing an interest of 6 per cent. if they are unable to borrow at 5 per cent.

After the failure of the loan of $470,000, as before stated, the Commissioners had no alternative but to make a loan to the Chenango canal from the surplus funds in their hands belonging to the Erie and Champlain Canal Fund. The contracts for the Chenango canal had all been made, and were rapidly approaching completion, and payment for these contracts could not be delayed without great injustice to the contractors, and the imputation of bad faith on the part of the State. The Commissioners therefore concluded to make a temporary loan to this canal at 5 per cent. interest, to be reimbursed as soon as money can be obtained on the stock authorised to be issued for the Chenango canal.

General Summary of the Direct Revenue from all the Canals, and the expenses of their maintenance.

The revenues derived immediately from the canals during the fiscal year, and the expenses of their maintenance are as follows, viz:

Revenue from Tolls.

Erie and Champlain canals,	$1,551,057	18
Oswego canal,	29,684	93
Cayuga and Seneca canal,	19,997	34
Chemung canal,	5,078	37
Crooked Lake canal,	1,959	90
	$1,607,771	72

Expenditure for Repairs and the collection of Tolls.

Erie and Champlain canals,	$425,539	39
Oswego canal,	49,894	98
Cayuga and Seneca canal,	28,060	04
Chemung canal,	16,661	04
Crooked Lake canal,	5,744	97
	$519,900	42
Surplus of the revenue of the canals from tolls, over and above the cost of their maintenance,	$1,087,871	30

The surplus above given exceeds the aggregate of the balance of the surplus, as shown by those statements, in precisely the amount paid for interest on the canal debts, which is not included in the foregoing.

REPORT OF THE SURVEY OF THE ROANOKE DANVILLE AND JUNCTION RAILROAD.—BY WALTER GWYNN, ENGINEER.

To the Subscribers of the Roanoke, Danville and Junction Railroad.

GENTLEMEN:—Circumstances well known to you and entirely beyond my control, delayed the commencement of the survey to a season much later than that in which field operations are usually begun. The spring, and the beginning of the summer were unavoidably permitted to pass away: and it was not until the 6th of July that the surveys were commenced. Since then two, and for a part of the time, three parties have been employed in the field, and in making the necessary calculations, and I now have the honor to lay before you the result of their labors.

For my guide and instructions in the discharge of the important duties which it was your pleasure to confide to me, I was referred by the Danville commissioners to the charter and to the proceedings of the Danville Convention. Keeping them constantly in view, mindful of the responsibility resting on me—and I may be permitted to say, with no disposition to avoid it, I have endeavored strictly to conform to the pledges of the one, and to the more formal declaration of the other. In both, it is made the duty of the Engineer to survey a route for a Railroad from "points intersecting the Petersburg and Roanoke, the Portsmouth, and Roanoke and the Greensville and Roanoke Railroads, or to such other points on either side of the Roanoke river as may best secure to the proposed route all the advantages of said roads, through Danville to some point within or near Evansham in the county of Wythe and State of Virginia.

In compliance with the requisition to connect the proposed improvement with the several railroads therein named, the following lines were traced.

The *first* :—commences at a point on the Weldon and Halifax Railroad, two miles south of Weldon—through this road a connexion can be formed with the Portsmouth, and through this last with the Petersburg and Roanoke railroads—it was then traced along on the ridge between the waters of the Roanoke and Quanky (a tributary of the Roanoke) and Tar rivers, to the Raleigh and Gaston railroad near Mrs. Little's.—This road unites with, in fact it is a continuation of the Greensville and Roanoke Railroad.

The length of this line is 21 miles, 1544 feet, and its cost as follows.

Excavation, Embankment, Stone Drains,		$221,120
Superstructure 21 miles, 1,544 ft. at $5000 pr mile,		106,462
	Total,	$327,462

The *second* line:—commencing at the termination of the Portsmouth and Roanoke railroad at Weldon, proceeds up the valley of the Roanoke to Gaston, where it unites with the Raleigh and Gaston railroad, and through that with the Greensville and Roanoke railroad. It unites also with the Petersburg and Roanoke through the Portsmouth and Roanoke railroad in the same manner as the first line.

Its length is 11 miles 4700 feet, and the cost as follows:

Excavation, Embankment, Stone Drains,		$152,915 05
Superstructure, 11 miles, 4,700 feet, at 5000 pr mile,		59,450 75
	Total,	$212,365 80

The *third* line—commences at the Portsmouth and Roanoke railroad, a quarter of a mile from the point where it crosses the Petersburg and Roanoke railroad, thence running about half a mile it unites with this last road, thence it pursues, in general terms the trace of the ridge dividing the waters of the Roanoke, Jack swamp, and Fontain's Cheek, until a junction is formed with the Greensville and Roanoke railroad, thus uniting with all three of the railroads named in the proceedings of the Danville Convention, and in the charter.

The length of this line is 14 miles, 1,440 feet, and its probable cost, for

Excavation, Embankment, Culverts and Drains,		$73,107 77
Superstructure, 14 miles, 1,440 feet at $5000 pr mile,		71,363 63
	Total,	$144,471 40

The maps herewith presented elucidate the subject more fully, and together with the cost of the different lines, will enable the Company to whom I consider the question properly belongs, to decide which, of the plans submitted is preferable. I would here state in connexion with this subject, that should the Ridge route to Danville, prove more eligible, the route of your railroad would be identical with the Raleigh and Gaston railroad for a distance of 31 miles, 4,120 feet, should the first line be adopted; 42 miles, 4,120 feet, should the second line be preferred; and should a preference be given to the third line, the route of the Greensville railroad would be pursued 4 miles, 75 feet, to the Roanoke river, and thence the Raleigh and Gaston railroad to Chalk Level, a distance of 42 miles, 4,120 feet, all which will be rendered more plain by reference to the map.

From the railroads on the Roanoke connected as above, to Danville, two routes present themselves. One on the ridge dividing the waters of the Roanoke from those of the Tar, the Neuse, and the Cape Fear rivers—the other along the valley of the Roanoke river, both of which should be surveyed preparatory to the location. The cost, grades, and curvatures cannot be compared with the accuracy, the importance of the subject demands, without an accurate instrumental survey.

In deciding upon the route for the preliminary survey, I was influenced mainly by the importance of presenting at as early a day as possible, some data, from which the practicability of the work might be inferred. Apprehensive of the health of the party in the valley of the river, I determined upon surveying the ridge route first. The justness of my apprehensions may be inferred from the fate of the Engineers employed in the valley of the Potomac river, which we may presume is not more unhealthy than that of the Roanoke.

The president of the Baltimore and Ohio railroad company, in his report to the stockholders, says: "In the month of August last the brigade employed on the Potomac, above Harper's Ferry, was broken up by the illness of nearly every one of its members, owing to the unhealthiness of the region in which they were at work. Protracted indisposition ensued, and it is only recently that the brigade has been organized. The country on the Potomac will not be sufficiently healthy for the brigade to resume its labors there before the 1st of November.

The same results were to be apprehended in the valley of the Roanoke, which would have occasioned a delay in presenting the estimates that might have operated injuriously on your interests. I have been thus particular, in order that it may not be inferred from the fact of the ridge route being first traced, that I have on this account given it a preference in my own mind.

Without further touching the points of comparison, I would however remark, that they must greatly preponderate in favor of the ridge route, to justify its undulatory profile and greater length, it being 172 miles, 2025 feet long, and the river route, by Mr. Brigg's survey, only 132 miles. Leaving therefore, the relative merits of the two routes to be set forth at a future day, by the locating engineer, suffice it to say, that the practicability of the railroad, may be asserted of either.

We will now confine our remarks more particularly to the ridge route, upon which our estimates are based. This route as I have before observed, will be identical with the Raleigh and Gaston railroad, to Chalk Level, the notes of which, from the point of intersection at Mrs. Little's, were politely tendered by Messrs. Garnet and Herron, and accepted by Mr. Pendleton the assistant engineer, at the time in charge of the party.

From Chalk Level, the route pursues the ridge, dividing the waters of the Roanoke from those of the Tar, the Neuse, and the Cape Fear rivers, to the head of Country Line Creek—thence it was traced on the ridge between Moon's and Hogan's Creeks (both tributaries to the Roanoke) passing near Lennox Castle to Mr. W. H. Nunnaly's where it crosses Hogan's Creek, and thence it is continued on the ridge between Dan river and Hogan's Creek to Danville.

With the exception of a grade of 60 feet to the mile near Roxboro', and at the crossing of Hogan's Creek, where grades as steep as 65 feet per mile are encountered (but which may be lessened by crossing higher up, lengthening the road, however, a mile or two,) the route may be considered as very favorable. Its most striking feature is its exemption from bridges; Hogan's Creek being the only stream which it crosses. Excepting the above, the grades, on this portion of the road may be readily overcome by locomotives drawing a train of 50 tons, at the rate of 15 miles per hour.

Careful examinations were made with the view of leaving the ridge in the neighborhood of Roxboro', and falling into the valley of the Dan, near Milton, and thus avoid the great *detour* around the head of Country Line Creek, but no discovery of a route was made, considered at all practicable.

The cost of the railroad to Danville, by whatever plan of junction with the roads on the Lower Roanoke, may be adopted, may be safely stated as follows.

Excavation, Embankment, Bridges and Culverts,		$1351,75
Superstructure, 172 miles, 2,025 feet at $5000 pr. mile,		861,91
		$2,213,67

No deduction is made in the above, for the portion of the Raleigh and Gaston railroad, which may be used in common.

The cost of the road is based on the following plan of

CONSTRUCTION.

WIDTH OF ROAD-BED.—The graded surface of the road in excavations to be 18 feet, and the slopes 45°. The graduated surface of the embankments to present a uniform width, of 13 feet, with side slopes of 33⅓ or 1½ base to 1 perpendicular.

THE SUPERSTRUCTURE, to consist of sills of stone, white oak, locust, chestnut or pine, whichever may be most convenient, 10 by 10 inches, and 8 feet long. If practicable, the timbers, before they are used, should be well seasoned and charred.

They should be laid on foundations five inches below the graded surface of the road, well consolidated by ramming; and when there is danger of frost, on broken stone bedded below its reach, four feet apart from centre to centre. The rails should be of the best heart pine, white oak,or chestnut, 6 by 6 inches, and 16, 24 or 25 feet long, planned on the upper surface, bevilled off, both on the inner and cuter edge, leaving a smooth flat bearing for the iron rail. The object of the bevil is to cast off the water more readily from the surface of the rail, and also to throw the bearing more on the centre.

The rails to be guaged to a uniform size, and covered with a good coat of boiled tar at their bearings on the sills, to which they should be secured by a tre-nail, and by wooden knees bedded in tar, and neatly fitted to the rails on each side. When stone sills are used, iron should be substituted for the knees.

The iron plate to be 2½ inches wide, by ¼ of an inch thick, fastened to the rail by spikes 5 inches long, and ¾ of an inch in diameter, driven through countersunk poles, 18 inches apart. The ends of the plates will be prevented from sinking into the rail by placing under them pieces of iron 6 inches long, 2½ inches wide, and ¼ of an inch thick. The width of the track should be 4 feet 8½ inches in the clear.

It is thought that by this mode of construction, the timbers will last much longer than in the ordinary plan of notching and keying the rail into the sill, in which case it can never be fitted so as entirely to exclude moisture, which occasions decay at the bearing both of the rail and sill,long before there is any indication of it elsewhere. By the plan here proposed, the rail rests on the *top* of the sill, is 5 inches above the graded surface of the road, and can be fitted to it through the intervention of tar, so as to be entirely impervious to moisture ; and from its high and dry situation above the ground, should any by possibility find its way between it and the sill, it receives the sun most favorably to its speedy evaporation.

And by the favorable exposure of the knees (on the top of the sill) they become heated entirely through by the sun, and thus evaporate any moistare which may get under them, and keep the timbers dry, and preserve them from decay.

THE ROUTE BETWEEN DANVILLE AND EVANSHAM.

About midway between these places, the range of the Alleghany mountains stretch across the route of the railroad. The country embracing the approach of the railroad to the mountains from the east, is peculiarly characterised by well defined ridges between the Sandy and Banister rivers, the Blackwater and Pig rivers, the Sandy and Smith rivers, and the Smith and Dan rivers, by their favorable direction, by ihe beautiful aspect of the valleys of the streams, presenting, with but few exceptions, wide and cultivated flats, and by the remarkable depression in the mountain as the common sources of the tributaries to these water-sources, and the tributaries to the streams which flow into New River. On the west of the mouutain, hills, mountains and valleys, disposed, as it were, by accident, and alternating with each other in rapid succession, give variety and beauty to the prospect. The course of the streams although devious, approach in general the direction of the line of the railroad. The valleys are generally narrow, and occasionally bounded by abrupt hills and precipices. An elegible route, however, can be obtained along them, both as respects grades and curvatures.

Passing New River, we immediately enter the great limestone valley of Virginia, a rolling country occasionally studded with hills and presenting many embarrassments in the location of the road.

For the beauty of its aspect, richness and fecundity of its soil and salubrity of its climate, this region is not surpassed by any portion of the State. Limestone the prevailing rock of this section, is found every where abundant and convenient.

The timber growth consists principally of oak, hickory and walnut. In the mountain, the growth, in addition to the above, comprises the chestnut, locust, maple, pine and cucumber trees. Sand-stone and rocks of a flinty and slaty structure, occur throughout the whole region from Danville to New River. Timber and rock adapted to the construction of the road, may be had almost every where conveniently.

The geographical features of the country indicate three routes for the proposed railroad.

The *first* passes along the ridge between Sandy and Banister Rivers, crosses Pig River just below the mouth of Snow Creek, thence on the ridge between Blackwater and Pig Rivers, and after passing Grassy Hill near Franklin Court House, it descends to Blackwater—thence up Blackwater and Daniel's Run to the summit of the mountain thence, in general terms, down Little River to New River, and along New River, Draper's valley and Reed Creek to Evansham.

The *second*, ascends along the valleys of the Dan and Smith's rivers and Rock Castle Creek, and crosses the Alleghany at Mawbrey's Cap ; thence it descends Laurel Fork and Big Reed Island Creek, to New River—and thence up New River and Reed Creek, to Evansham.

The *third*, passes along the Dan River up to the mouth of Archy's Creek to a *plateau* called Chalk Level, which it crosses and then descends Clark's Creek to the Arrarat, down the Arrarat to Loving Creek, and thence ascending along Loving Creek and passing near Mount Airy, it falls into the valley of Paul Creek, which it ascends to its source, at a depression in the mountain called the Buffalo trace, thence it descends along Little and Big Reed Island Creeks to New River, and thence to Evansham as in the preceeding route.

In deciding the question at this time of choice between these routes in a professional point of view, it is only necessary under the peculiarity of the formation of the country, to submit them to the following very obvious principle :

Which route affords the most uninterrupted and greatest aggregate descent (the grades of course being limited) in the direction of the heaviest traffic.

The application of this principle will give a result greatly in favor of the *second* route which takes its course through Mawbrey's Gap. On this there will be found no descent westward, except the descent from the mountain which appertains to each route. while on both of the other routes an undulatory profile is encountered, with considerable descents towards the mountain, and consequently ascents in the direction of the *heaviest traffic*.

The second route possesses the advantage also of being shorter than either of the others.

In deciding on the route upon which to base my estimate of cost and practicability, I was influenced by the following considera tions.

That previously to the location of the road and as preliminary thereto, it would be necessary to survey each route and make an accurate comparison of their relative advantages : nothing short of this, would satisfy the public mind and enable the stockholders to decide upon the line of the road. And with the view of cutting off the angle formed between the Dan and Smith's river at their confluence, I would direct the attention of the locating Engineer, to the beautiful ridge between Sandy and Smith's rivers. Indeed it rarely happens that in a country like this under consideration, the Engineer is so fortunate as to find his observation confined to so few routes. In selecting the line of railway between Washington and Baltimore, only 40 miles in length, it was found necessary to survey in the minutest manner no less than twelve distinct routes besides tracing the water courses and making innumerable offsets to the right and left of the various lines; and for the Boston and Providence railroad the experimental surveys embrace eleven routes.

Having determined then in my own mind, that to enable those interested to decide upon the merits of these routes, an actual survey of them would be indispensable, the selection of one for the preliminary survey would seem therefore to be rendered a question of but little moment.

In relation to the *second* route, although I have expressed my opinion in favor of its greater eligibility, I did not think it prudent in the incipiency of the undertaking to select it for the basis of my calculations; because it had been reported upon by the late eminent Engineer of the State, as rather unfavorable for a turnpike. Although it is well known to many of you that the survey upon which his estimate was based was made in the most cursory manner, by one of his assistants, and that the ground was not examined by Captain Crozet—yet the report of so distinguished

an Engineer, however erroneous from the incorrectness of the data furnished by his assistants, and for which he could not in the multiplicity of his duties be held responsible, might have been seized upon and handled by those in favor of other routes, and by those unfriendly to the scheme, to its serious injury. I would here take occasion to say that the estimates of Capt. Crozet as far as they have been tested, have proved to be as correct as those of any Engineer in the Country; and I would place the most implicit confidence in any estimate of his, based upon operations conducted by him in person, or of sufficient importance to command his particular attention.

For the reasons stated, my decision was narrowed down to a choice between the *first* and *third* routes. These equally circuitous, and presenting, with the exception of the Buffalo trace, which is the most favorable pass—about the same objections in the profiles. I could not hesitate in selecting for the preliminary survey, the route which would penetrate farthest into the State of Virginia.

The *first* route therefore, is the one from which I infer the cost of the railroad from Danville to Evansham. By the survey, its total length is 137 miles, 2,865 feet, which I shall divide into Eastern, Mountain, and Western Divisions.

(Continued in our next.)

The following extract from Ure's Philosophy of Manufactures, (a work but little known in this country,) will be found to contain much useful knowledge for the practical and theoretical mechanician.

From Ure's Philosophy of Manufactures.

GENERAL VIEW OF MANUFACTURING INDUSTRY.

MANUFACTURE is a word, which, in the vicissitude of language, has come to signify the reverse of its intrinsic meaning, for it now denotes every extensive product of art, which is made by machinery, with little or no aid of the human hand; so that the most perfect manufacture is that which dispenses entirely with manual labor. The philosophy of manufactures is therefore an exposition of the general principles, on which productive industry should be conducted by self-acting machines. The end of a manufacture is to modify the texture, form, or composition of natural objects by mechanical or chemical forces, acting either separately, combined, or in succession.—Hence the automatic arts subservient to general commerce may be distinguished into Mechanical and Chemical, according as they modify the external form or the internal constitution of their subject matter. An indefinite variety of objects may be subjected to each system of action, but they may be all conveniently classified into animal, vegetable, and mineral.

A mechanical manufacture being commonly occupied with one substance, which it conducts through metamorphoses in regular succession, may be made nearly automatic; whereas a chemical manufacture depends on the play of delicate affinities between two or more substances, which it has to subject to heat and mixture under circumstances somewhat uncertain, and must therefore remain, to a corresponding extent, a manual operation. The best example of *pure* chemistry on self-acting principles which I have seen, was in a manufacture of sulphuric acid, where the sulphur being kindled and properly set in train with the nitre, atmospheric air, and water, carried on the process through a labyrinth of compartments, and supplied the requisite heat of concentration, till it brought forth a finished commercial product. The finest model of an automatic manufacture of *mixed* chemistry is the five-colored calico machine, which continuously, and spontaneously, so to speak, prints beautiful webs of cloth with admirable precision and speed. It is in a cotton mill, however, that the perfection of automatic industry is to be seen; it is there that the elemental powers have been made to animate millions of complex organs, infusing into forms of wood, iron, and brass an intelligent agency. And as the philosophy of the fine arts, poetry, painting, and music may be best studied in their individual master-pieces, so may the philosophy of manufactures in this its noblest creation.

There are four distinct classes of textile fibres, cotton, wool, flax, and silk, which constitute the subjects of four, or, more correctly speaking, five distinct classes o factories; first, the cotton factories; second, the woollen; third, the worsted; fourth, the flax, hempen, or linen; and fifth, the silk. These five factories have each peculiarities proceeding from the peculiarities of its raw material and of its fabrics; but they all possess certain family features, for they all employ torsion to convert the loose slender fibres of vegetable or animal origin into firm coherent threads, and, with the exception of silk, they all employ extension also to attenuate and equalize these threads, technically styled yarn. Even one kind of silk which occurs in entangled tufts, called floss, is spun like cotton, by the simultaneous action of stretching and twisting.

The above-named five orders of factories are, throughout this kingdom, set in motion by steam-engines or water-wheels; they all give employment to multitudes of children or adolescents; and they have therefore been subjected to certain legislative provisions, defined in the *Factories Legulation Act*, passed by Parliament on the 29th August, 1833.

It is probable that 614,200 work-people are constantly engaged within the factories of the United Kingdom: of which number 561,900 belong to England and Wales; 46,825 to Scotland; and 5,475 to Ireland.* Fully five-tenths of them are under twenty-one years of age, and three-tenths of these young persons are females. It must be remembered, however, that besides these 614,200 inmates of factories, a vast population derives a livelihood from the manufactures of cotton, wool, flax, and silk, such as the hand-weavers, the calico-printers and dyers, the frame-work knitters, the lace-makers, lace-runners, muslin-sewers, &c. &c.

It appears from the Parliamentary Returns of 1831, that in Great Britain, out of a total population of 16,539,318 persons, there are of

Agricultural Laborers and Laboring Occupiers,	1,055,982, and of
Manufacturing Laborers,	404,317

Whence there are 1000 agricultural to 383 strictly manufacturing laborers.

Persons employed in retail trade, or in handicraft, as masters or workmen,	1,159,867
Total adult persons employed in arts and trades,	1,564,184 being

about fifty per cent. more than those engaged in agriculture.

The capitalists, bankers, professional and other educated men amout to	214,390
Laborers non-agricultural to	618,712
If we include in the agricultural department, the occupiers employing laborers, (few of whom, however, work,) we shall have to add	187,075
To the above number,	1,055,057
The total sum of Agriculturists is	1,243,057, being

only 80 per cent. of the adult males employed in manufactures, arts, and trades.

When we take into account the vastly greater proportion of young persons constantly occupied with factory labor, than of those occupied with agricultural labor, we shall then be led to conclude that at least double the amount of personal industry is engaged in the arts, manufactures, and trade, to what is engaged in agriculture. Considerably upwards of one-tenth of the population of this island is actually employed in manufactures; and probably little more than one-fifteenth in agriculture, This conclusion ought to lead our legislative landlords to treat the manufacturing interests with greater respect than they have usually been accustomed to do. If we consider, moreover, how much greater a mass of productive industry a male adult is equivalent to, in power-driven manufactures, than in agriculture, the balance in favor of the former will be greatly enhanced.

France, which has for upwards of a century and a half tried every scheme of public premium to become a great manufacturing country, has a much less propor-

* The above numbers for Scotland and Ireland are taken from Mr. Leonard Horner's excellent Report as Factory Inspector; the number for England is computed on the recognized DATUM that it is twelve times greater for the cotton trade than that of Scotland. For the last official details see the Appendix.

tion than one employed in trade for two employed in agriculture. M. Chsrles Dupin, indeed, has been led by his researches into the comparative industry of France and of the United Kingdom, to conclude that the agricultural produce of our country amounted in value to 240 millions sterling, and that of his own to 180 millions sterling, being the ratio of three to two; and that our manufacturing power is inferior to that of France in the proportion of sixty-three to seventy-two; or as seven is eight. There can be no doubt that his agricultural estimate underrates France, as much as his manufacturing estimate underrates Great Britian.

This Island is pre-eminent among civilized nations for the prodigious development of its factory wealth, and has been therefore long viewed with a jealous admiration by foreign powers. This very pre-eminence, however, has been contemplated in a very different light by many influential members of our own community, and has been even denounced by them as the certain origin of innumerable evils to the people, and of revolutionary convulsions to the state. If the affairs of the kingdom be wisely administered, I believe such allegations and fears will prove to be groundless, and to proceed more from the envy of one ancient and powerful order of the commonwealth, towards another suddenly grown into political importance than from the nature of things.

In the recent discussions concerning our factories, no circumstance is so deserving of remark, as the gross ignorance evinced by our leading legislators and economists, gentlemen well informed in other respects, relative to the nature of those stupendous manufactures which have so long provided the rulers of the kingdom with the resources of war, and a great body of the people with comfortable subsistence; which have, in fact, made this island the arbiter of many nations, and the benefactor of the globe itself.* Till this ignorance be dispelled, no sound legislation need be expected on manufacturing subjects. To effect this purpose is a principal, but not the sole aim of the present volume, for it is intended also to convey specific information to the classes directly concerned in the manufactures, as well as general knowledge to the community at large, and particularly to young persons about to make the choice of a profession.

The blessings which physico-mechanical science has bestowed on society, and the means it has still in store for ameliorating the lot of mankind, have been too late dwelt upon; while, on the other hand, it has been accused of lending itself to the rich capitalists as an instrument for harassing the poor, and of exacting from the operative an accelerated rate of work. It has been said, for example, that the steam-engine now drives the power-looms with such velocity as to urge on their attendant weavers at the same rapid pace; but that the hand-weaver, not being subjected, to this restless agent, can throw his shuttle and move his treddles at his convenience. There is, however, this difference in the two cases, that in the factory, every member of the loom is so adjusted, that the driving force leaves the attendant nearly nothing at all to do, certainly no muscular fatigue to sustain, while it procures for him good, unfailing wages, besides a healthy workshop *gratis:* whereas the non-factory weaver, having everything to execute by muscular exertion, finds the labor irksome, makes in consequence innumerable short pauses, separately of little account, but great when added together; earns therefore proportionably low wages, while he loses his health, by poor diet and the dampness of his hovel. Dr. Carbutt of Manchester says, "With regard to Sir Robert Peel's assertion a few evenings ago, that the hand-loom weavers are mostly small farmers, nothing can be a greater mistake; they live, or rather they just keep life together, in the most miserable manner, in the cellars and garrets of the town, working sixteen or eighteen hours for the merest pittance."*

The constant aim and effect of scientific improvement in manufactures are philanthropic, as they tend to relieve the workmen either from niceties of adjustment which exhaust his mind and fatigue his eyes, or from painful repetition of effort which distort or wear out his frame. At every step of each manufacturing process described in this volume, the humanity of science will be manifest. New illustrations of this truth appear almost every day, of which a remarkable one has jnst come to my knowledge. In the woollen-cloth trade there is a process between carding and spinning the wool, called *slubbing* which converts the spongy rolls, turned off from the cards, into a continuous length of fine porous cord. Now, though carding and spinning lie within the domain of automatic science, yet slubbing is a handicraft operation, depending on the skill of the slubber, and participating therefore in all his irregularities. If he be a steady, temperate man, he will conduct his business regularly, without needing to harass his juvenile assistants, who join together the series of card rolls, and thus feed his machine; but if he be addicted to liquor, and passionate, he has it in his power to exercise a fearful despotism over the young pieceners, in violation of the proprietors benevolent regulations. This class of operatives, who, though inmates of factories, are not, properly speaking, factory workers, being independent of the moving power, have been the principal source of the obloquy so unsparingly cast on the cotton and other factories, in which no such capricious practice or cruelties exist. The wool slubber, when behind hand with his work, after a visit to the beer-shop, resumes his task with violence, and drives his machine at a speed beyond the power of the pieceners to accompany; and if he finds them deficient in the least point, he does not hesitate to lift up the long wooden rod from his slubbing-frame, called a billy-roller, and beat them unmercifully. I rejoice to find that science now promises to rescue this branch of the business from handicraft caprice, and to place it, like the rest, under the safeguard of automatic mechanism. The details of this recent invention will be given in describing the woollen manufacture.

The processes that may be employed, to give to portions of inert matter, precise movements resembling those of organized beings, are innumerable as they consist of an indefinite number and variety of cords, pulleys, toothed-wheels, nails, screws, levers, inclined-planes as well as agencies of air, water, fire, light, &c., combined in endless modes to produce a desired effect. Ingenuity has been long exercised on such combinations, chiefly for public amusement or mystification, without any object of utility. In ancient times the statue of Memnon was celebrated for emitting harmonious sounds at sun-rise, and acted probably by concealed organ-pipes. The flying pigeon of Archytas was more manifestly an automatic mechanism, as it performed all the motions of an animal; and likewise the Android of Albert the Great, which opened a door when any one knocked, and muttered certain sounds, as if speaking to the visiter. The brass heads, or conversible busts of Abbe Mical, were probably a simple acoustic experiment on the transmission of sounds through tubes, like the Invisible Girl. More recently the flute-player of Vaucanson has puzzled the world. It presented the appearance of a human figure of the ordinary size, seated on a piece of rock, supported on a pedestal four feet and a half high. By the movements of its lips, fingers, and tongue, it modified the tones of a flute, and executed twelve different airs on the instrument. Vaucanson constructed also a drummer, which played on a flute with a three holed mouth piece, no less than twenty airs. Standing upright on a pedestal, dressed like a dancing shepherd, holding its flageolet in one hand, and a rod in the other, it beat the drum at one time in single taps, and at another in a long roll, as accompaniments to the flageolet tune. This automaton seemed to be truly the animated leader of the pleasures of a ball, skilful in augmenting or diminishing the breathing sounds of its instrument, with equal precision and taste.

The duck of the same celebrated mechanician, not only imitated the different movements of this animal, drinking, gobbling, swallowing, &c., but also represented faithfully the structure of the internal viscera for the digestion of the food. The play of every part necessary to discharge these functions was imitated to the life; for the duck drank, dabbled in the water, stretched out its neck to take grain when offered to it in the hand, drew back its head again to swallow it, doubled the quickness of the masticating movements in passing the grain into the stomach, like the living duck, which always swallows its food very hastily. The grain was then ground in the gizzard, as preparatory to digestion; and finally subjected to excrementitious actions. Its wings, neck, head, and whole frame, were imitated bone by bone, and arranged in their natural form and order. When once wound up, the duck went through all its vital evolutions without needing to be touched. These machines were purchased by Professor Bayreuss, of Helmstadt.

The chess-player of M. Maelzel, now under exhibition at Paris, and formerly shown in this country, has been often described. It imitates very remarkably a living being, en-

* Even the eminent statesman lately selected by his Sovereign to wield the destinies of this commercial empire—Sir Robert Peel, who drives his family consequence from the cotton trade, seems to be but little conversant with its nature and condition.—See Dr. Carbutt's observations on the subject, next page.

* Letter of 3rd of May, 1833, to Dr. Hawkins in his Medical Report, Factory Commission, p. 232.

dowed with all the resouces of intelligence, for executing the combinations of profound study.

Raisin's automaton harpsichord was found to contain an infant performer.

Self-acting inventions like the preceding, however admirable as exercises of mechanical science, do nothing towards the supply of the physical necessities of society. Man stands in daily want of food, fuel, clothing, and shelter; and is bound to devote the powers of body and mind, of nature and art, in the first place to provide for himself and his dependents a sufficiency of these necessaries, without which there can be no comfort, nor leisure for the cultivation of the taste and intellect. To the production of food and domestic accommodation, not many automatic inventions have been applied, or seem to be extensively applicable; though, for modifying them to the purposes of luxury, many curious contrivances have been made. Machines, more or less automatic, are embodied in the coal-mines of Great Britain; but such combinations have been mainly directed, in this as well as other countries, to the materials of clothing. These chiefly consist of flexible fibres of vegetable or animal origin, twisted into smooth, tenacious threads, which are then woven into cloth by being decussated in a loom. Of the animal kingdom, silk, wool, and hair, are the principal textile products. The vegetable tribes furnish cotton, flax, hemp, besides several other fibrous substances of inferior importance.

Wool, flax, hemp, and silk, have been very generally worked up among the nations of Europe, both in ancient and modern times; but cotton attire was, till sixty years ago, confined very much to Hindostan, and some other districts of Asia. No textile filaments however are, by their facility of production as well as their structure, so well adapted as those of cotton to furnish articles of clothing, combining comfort with beauty and convenience in an eminent degree. Hence we can understand how cotton fabrics, in their endless variety of textures and styles, plain, figured, and colored, have within the short period of one human life, grown into an enormous manufacture, have become an object of the first desire to mankind all over the globe, and of zealous industry to the most civilized states. This business has received its great automatic developement in England, though it was cultivated to a considerable extent on handicraft principles in France a century ago and warmly encouraged by the government of that country, both as to the growth of the material and its conversion into cloth. The failure of the French however to establish a factory system prior to the English is a very remarkable fact, and proves clearly that mechanical invention, for which the former nation have long been justly celebrated, is not of itself sufficient to found a successful manufacture.

We have adverted to the mechanisms of Vaucanson. This inventive artisan directed his attention also to productive machines. He constructed one for winding silk as long ago as 1749; one for doubling and twisting it in 1751; a tapestry loom in 1758; another for winding silk in 1770; a machine for laminating stuffs in 1757, and a plan of mounting silk mills in 1776. There can be no doubt as to the value of these inventions, as they were described with merited eulogiums in the above named years by the Academy of Paris. In 1776 he published an account of the Indian mode of weaving fine muslins in the wet state, showing that his attention had been turned likewise to the cotton trade.

The term *Factory*, in technology, designates the combined operation of many orders of work-people, adult and young, in tending with assiduous skill a system of productive machines continuously impelled by a central power. This definition includes such organizations as cotton-mills, flax-mills, silk-mills, woolen-mills, and certain engineering works; but it excludes those in which the mechanisms do not form a connected series, nor are dependent on one prime mover. Of the latter class, examples occur in iron-works, dye-works, soap-works, brass-foundries, &c. Some authors, indeed have comprehended under the title *factory*, all extensive establishments wherein a number of people co-operate towards a common purpose of art; and would therefore rank breweries, distilleries as well as the workshops of carpenters, turners, coopers, &c. under the factory system. But I conceive that this title, in its strictest sense, involvs the idea of a vast automaton, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of a common object, all of them being subordinated to a self regulated moving force. If the marshalling of human beings in systematic order for the execution of any technical enterprise were allowed to constitute a factory, this term might embrace every department of civil and military engineering; a latitude of application quite inadmissable.

In its precise acceptation, the factory system is of recent origin, and may claim England for its birth-place. The mills for throwing silk, or making organzine, which were mounted centuries ago in several of the Italian states, and furtively transferred to this country by Sir Thomas Lombe in 1718, contained indeed certain elements of a factory, and probably suggested some hints of those grander and more complex combinations of self-acting machines, which were first embodied half a century later in our cotton manufacture by Richard Arkwright, assisted by gentlemen of Derby, well acquainted with its celebrated silk establishment. But the spinning of an entangled flock of fibres into a smooth thread, which constitutes the main operation with cotton, is in silk superfluous; being already performed by the unering instinct of a worm, which leaves to human art the simple task of doubling and twisting its regular filaments. The apparatus requisite for this purpose is more elementary, and calls for a few of those gradations of machinery which are needed in the carding, drawing, roving, and spinning processes of a cotton-mill.

When the first water-frames for spinning cotton were erected at Cromford, in the romantic valley of the Derwent, about sixty years ago, mankind were little aware of the mighty revolution which the new system of labor was destined by Providence to achieve, not only in the structure of British society, but in the fortunes of the world at large. Arkwright alone had the sagacity to discern, and the boldness to predict in glowiug language, how vastly productive human industry would become, when no longer proportioned in its results to muscular effort, which is by its nature fitful and capricious, but when made to consist in the task of guiding the work of mechanical fingers and arms, regularly impelled with great velocity by some indefatigable physical power. What his judgment so clearly led him to perceive, his energy of will enabled him to realize with such rapidity and success, as would have done honor to the most influential individuals, but were truly wonderful in that obscure and indigent artisan. The main difficulty did not, to my apprehension, lie so much in the invention of a proper self-acting mechanism for drawing out and twisting cotton into a continuous thread, as in the distribution of the different members of the apparatus into one co-operatire body, in impelling each organ with its appropriate delicacy and speed, and above all, in training human beings to renounce their desultory habits of work, and to identify themselves with the unvarying regularity of the complex automaton. To devise and administer a successful code of factory discipline, suited to the necessities of factory diligence, was the Herculean enterprise, the noble achievment of Arkwright. Even at the present day, when the system is perfectly organized, and its labor lightened to the utmost, it is found nearly impossible to convert persons past the age of puberty, whether drawn from rural or from handicraft occupations, into useful factory hands. After struggling for a while to conquer their listless or restive habits, they either renounce the employment spontaneously, or are dismissed by the overlookers on account of inattention.

If the factory Briareus could have been created by mechanical genius alone, it should have come in o being thirty years sooner; for upwards of ninety years have now elapsed since John Wyatt of Birmingham, not only invented the series of fluted rollers, (the spinning fingers usually ascribed to Arkwright,) but obtained a patent for the invention, and erected "a spinning engine without hands" in his native town. The details of this remarkable circumstance, recently snatched from oblivion, will be given in our treatise on the cotton manufactures. Wyatt was a man of good education, in a respectable walk of life, much esteemed by his superiors, and therefore favorably placed, in a mechanical point of view, for maturing his admirable scheme. But he was of a gentle and passive spirit, little qualified to cope with the hardships of a new manufacturing enterprize. It required in fact, a man of Napoleon nerve and ambition, to subdue the refractory tempers of work-people accustomed to irregular paroxysms of dilligence, and to urge on his multifarious and intricate constructions in the face of prejudice, passion, and envy. Such was Arkwright, who, suffering nothing to stay

or turn aside his progress, arrived gloriously at the goal, and has forever affixed his name to a great era in the annals of mankind, an era which has laid open unbounded prospects of wealth and comfort to the industrious, however much they may have been occasionally clouded by ignorance and folly.

Prior to this period, manufactures were everywhere feeble and fluctuating in their development; shooting forth luxuriantly for a season, and again withering almost to the roots, like annual plants. Their perennial growth now began in England, and attracted capital in copious streams to irrigate the rich domains of industry. When this new career commenced, about the year 1770, the annual consumption of cotton in British manufactures was under four millions of pounds weight, and that of the whole of Christendom was probably not more than ten millions. Last year the consumption in Great Britain and Ireland was about two hundred and seventy millions of pounds, and that of Europe and the United States together four hundred and eighty millions. This prodigious increase is, without doubt, almost entirely due to the factory system founded and upreared by the intrepid native of Preston. If then this system be not merely an inevitable step in the social progression of the world, but the one which gives a commanding station and influence to the people who most resolutely take it, it does not become any man, far less a denizen of this favored land, to vilify the author of a benefaction, which, wisely administered, may become the best temporal gift of Providence to the poor, a blessing destined to mitigate, and in some measure to repeal, the primeval curse prononnced on the labor of man, "in the sweat of thy face shalt thou eat bread." Arkwright well deserves to live in honored remembrance among those ancient master-spirits, who persuaded their roaming companions to exchange the precarious toils of the chase, for the settled comforts of agriculture.

In my recent tour, continued during several months, through the manufacturing districts, I have seen tens of thousands of old, young, and middle-aged of both sexes, many of them too feeble to get their daily bread by any of the former modes of industry, earning abundant food, raiment, and domestic accommodation, without perspiring at a single pore, screened meanwhile from the summer's sun and the winter's frost, in apartments more airy and salubrious than those of the metropolis, in which our legislative and fashionable aristocracies assemble. In those spacious halls the benignant power of steam summons around him his myriads of willing menials, and assigns to each the regulated task, substituting for painful muscular effort on their part, the energies of his own gigantic arm, and demanding in return only attention and dexterity to correct such little aberrations as casually occur in his workmanship. The gentle docility of this moving force qualifies it for impelling the tiny bobbins of the lace-machine with a precision and speed inimitable by the most dexterous hands, directed by the sharpest eyes. Hence, under its auspices, and in obedience to Arkwright's polity, magnificent edifices, surpassing far in number, value, usefulness, and ingenuity of construction, the boasted monuments of Asiatic, Egyptian, and Roman despotism, have, within the short period of fifty years, risen up in this kingdom, to show to what extent, capital, industry, and science may augment the resources of a state, while they meliorate the condition of its citizens. Such is the factory system, replete with prodigies in mechanics and political economy, which promises, in its future growth, to become the great minister of civilization to the terraqueous globe, enabling this country, as its heart, to diffuse along with its commerce, the life-blood of science and religion to myriads of people still lying "in the region and shadow of death."

When Adams Smith wrote his immortal elements of economics, automatic machinery being hardly known, he was properly led to regard the division of labor as the grand principle of manufacturing improvement; and he showed, in the example of pin-making, how each handicraftsman, being thereby enabled to perfect himself by practice in one point, became a quicker and cheaper workman. In each branch of manufacture he saw that some parts were, on that principle, of easy execution, like the cutting of pin wires into uniform lengths, and some were comparatively difficult, like the formation and fixation of their heads; and therefore he concluded that to each a workman of appropriate value and cost was naturally assigned. This appropriation forms the very essence of the division of labor, and has been constantly made since the origin of society. The ploughman, with powerful hand and skilful eye, has been always hired at high wages to form the furrow, and the ploughboy at low wages, to lead the team. But what was in Dr. Smith's time a topic of useful illustration, cannot now be used without risk of misleading the public mind as to the right principle of manufacturing industry. In fact, the division, or rather adptation of labor to the different talents of men, is little thought of in factory employment. On the contrary, wherever a process requires peculiar dexterity and steadiness of hand, it is withdrawn as soon as possible from the *cunning* workman, who is prone to irregularities of many kinds, and it is placed in charge of a peculiar mechanism, so self-regulated, that a child may superintend it. Thus, to take an example from the spinning of cotton—the first operation in delicacy and importance, is that of laying the fibres truly parallel in the spongy slivers, and the next is that of drawing these out into slender spongy cords, called rovings, with the least possible twist; both being perfectly uniform throughout their total length. To execute either of these processes tolerably by a hand-wheel, would require a degree of skill not to be met with in one artizan out of a hundred. But fine yarn could not be made in factory-spinning except by making these steps, nor was it ever made by machinery till Arkwright's sagacity contrived them. Moderately good yarn may be spun indeed on the *hand-wheel* without any drawings at all, and with even indifferent rovings, because the thread, under the two-fold action of twisting and extension, has a tendency to equalize itself.

The principle of the factory system then is, to substitute mechanical science for hand skill, and the partition of a process into its essential constituents, for the division or graduation of labor among artizans. On the handicraft plan, labor more or less skilled, was usually the most expensive element of production—*materiam superabat opvs*; but on the automatic plan, skilled labor gets progressively superseded, and will, eventually, be replaced by mere overlookers of machines.

By the infirmity of human nature it happens, that the more skilful the workman, the more self-willed and intractible he is apt to become, and, of course, the less fit a component of a mechanical system, in which, by occasional irregularities, he may do great damage to the whole. The grand object therefore of the modern manufacturer is, through the union of capital and science, to reduce the task of his workpeople to the exercise of vigilance and dexterity,—faculties, when concentred to one process, speedily brought to perfection in the young. In the infancy of mecanical engineering, a machine-factory displayed the division of labor in manifold gradations—the file, the drill, the lathe, having each its different workmen in the order of skill: but the dexterous hands of the filer and driller are now superseded by the planing, the key-groove cutting, and the drilling machines; and those of the iron and brass turners, by the self-acting slide-lathe. Mr. Anthony Strutt, who conducts the mechanical department of the great cotton factories of Belper and Milford, has so thoroughly departed from the old routine of the schools, that he will employ no man who has learned his craft by regular apprenticeship; but in contempt, as it were, of the division of labor principle, he sets a ploughboy to turn a shaft of perhaps several tons weight, and never has reason to repent his preference, because he infuses into the turning apparatus a precision of action, equal, if not superior, to the skill of the most experienced journeyman.

An eminent mechanician in Manchester told me, that he does not choose to make any steam-engines at present, because with his existing means, he would need to resort to the old principle of the division of labor, so fruitful of jealousies and strikes among workmen; but he intends to prosecute that branch of business whenever he has prepared suitable arrangements on the equalization of labor, or automatic plan. On the graduation system, a man must serve an apprenticeship of many years before his hand and eye become skilled enough for certain mechanical feats; but on the system of decomposing a process into its constituents, and embodying each part in an automatic machine, a person of common care and capacity may be entrusted with any of the said elementary parts after a short probation, and may be transferred from one to another, on any emergency, at the discretion of the master. Such translations are utterly at variance

with the old practice of the division of labor, which fixed one man to shaping the head of a pin, and another to sharpening its point, with most irksome and spirit-wasting uniformity, for a whole life.

It was indeed a subject of regret to observe how frequently the workman's eminence, in any craft, had to be purchased by the sacrifice of his health and comfort. To one unvaried operation, which required unremitting dexterity and dilligence, his hand and eye were constantly on the strain, or if they were suffered to swerve from their task for a time, considerable loss ensued, either to the employer, or the operative, according as the work was done by the day or by the piece. But on the equalization plan of self-acting machines, the operative needs to call his faculties only into agreeable exercise; he is seldom harassed with anxiety or fatigue, and may find many leisure moments for either amusement or meditation, without detriment to his master's interest or his own. As his business consists in tending the work of a well regulated mechanism, he can learn it in a short period; and when he transfers his services from one machine to another, he varies his task, and enlarges his views, by thinking on those general combinations which result from his and his companions' labors. Thus, that cramping of the faculties, that narrowing of the mind, that stunting of the frame, which were ascribed, and not unjustly, by moral writers, to the division of labor, cannot, in common circumstances, occur under the equable distribution of industry. How superior in vigor and intelligence are the factory mechanics in Lancashire, where the latter system of labor prevails, to the handicraft artizans of London, who, to a great extent, continue slaves to the former! The one set is familliar with almost every physico-mechanical combination, while the other seldom knows anything beyond the pin-head sphere of his daily task.

It is, in fact, the constant aim and tendency of every improvement in machinery to supersede human labor altogether, or to diminish its cost, by substituting the industry of women and children for that of men; or that of ordinary laborers, for trained artizans. In most of the water-twist, or throstle cotton mills, the spinning is entirely managed by females of sixteen years and upwards. The effect of substituting the self-acting mule for the common mule, is to discharge the greater part of the men spinners, and to retain adolescents and children. The proprietor of a factory near Stockport states, in evidence to the commissioners, that by such substitution, he would save 50*l.* a week in wages, in consequence of dispensing with nearly forty male spinners, at about 25*s.* of wages each. This tendency to employ merely children with watchful eyes and nimble fingers, instead of journeymen of long experience, shows how the scholastic dogma of the division of labor into degrees of skill has been exploded by our enlightened manufacturers.

They are, in truth, much better acquainted with the general economy of the arts, and better qualified to analyse them into their real principles, than the recluse academician can possibly be, who from a few obsolete data, traces out imaginary results, or conjures up difficulties seldom encountered in practice. He may fancy, for example, that in a great establishment, where several hundred people are employed in producing fine goods, much time and expense must be incurred in verifying the quality and quantity of the work done by each individual. But this verification forms an integral step in the train of operations, and therefore constitutes no appreciable part of the cost of the manufactured article. Thus, for example, the reeling of yarn into hanks measures its length; the weighing of a few miscellaneous hanks determines the grist of the whole; and the *taker-in of work* rapidly ascertains its soundness.—For examining the quality of the very fine yarns used in lace-making, he is aided by machines which register rapidly the uniformity of its cohesive strength, and the exact volume which one hundred yards of it occupy. The lace-maker again, on his part, verifies the grist of all the thread he purchases, in the necessary act of filling the circular grooves of his tiny bobbins, preparatory to their entering into his machine.

The university man, pre-occupied with theoretical *formulæ*, of little practical bearing, is too apt to undervalue the science of the factory, though, with candor and patience, he would find it replete with useful applications of the most beautiful dynamical and statical problems. In physics, too, he would there see many theorems bearing golden fruit, which had been long barren in college ground. The phenomena of heat, in particular, are investigated in their multifarious relations to matter, solid, liquid, and aeriform. The measure of temperature on every scale is familiar to the manufacturer, as well as the distribution of caloric, and its habitudes with different bodies. The production of vapors; the relation of their elastic force to their temperature; the modes of using them as instruments of power, and sources of heat; their most effective condensation; their hygrometric agency; may all be better studied in a week's residence in Lancashire, than in a session of any university in Europe. And as to exact mechanical science, no school can compete with a modern cotton-mill.

When a certain elevation of temperature is made to give pliancy to the fibres of cotton or wool, the philosophical spinner sees the influence of caloric in imparting ductility and elasticity to bodies. The thermometer to indicate the temperature, and the hygrometer the humidity of the air, give him an insight into the constitution of nature unknown to the bulk of mankind. Of the different dilatations of different solids by increments of temperature, he has daily experience in the elongation of the immense systems of steam-pipes which heat his mill apartments, often extending three hundred feet in a straight line. On this scale, the amount of the expansion, and contraction, needs no micrometer to measure it, for it is visible to the eye, and may be determined by a carpenter's rule.

When fire-proof factories of iron and brick were first built, the columns which supported the successive floors, being hollow, were intended to admit steam, and to be the channels of communicating heat to the apartments. It was soon found, however, that the lengthening and shortening of a columnar range eighty or ninety feet high, by alternations of temperature, equal to 170° F., were so considerable, as to impair the stability of the most solid edifice, since metal changes its dimensions by heat with irresistible force. This project of frugality being therefore abandoned, horizontal, steam-pipes were suspended near the ceiling, by swinging rods of iron, which terminated at one end in a curved copper tube, for allowing the water of condensation to escape, and possessed of such pliancy as to give free play to the expansion and contraction. Ingenious expedients have been proposed for causing the lengthening of the main pipes to regulate the admission of steam into them, and to exclude it as soon as the temperature of the range had reached the proper pitch. An invention of this kind was made the subject of a patent many years ago, but it never came into general use, on account of certain irregularities in its performance. It was found very difficult so to adjust the lever mechanism of the valve, as to prevent its intercepting the flow of the steam whenever a certain portion of the long pipe was heated, long before the steam had reached the remoter end. Hence its uniform distribution was rendered precarious. Mill engineers have therefore satisfied themselves with insulating the steam-pipe ramifications from the building, leaving the circulation of the steam to be tempered by an ordinary stop-cock. The instrument, for which I have obtained a patent, under the name of the heat-governor, or thermostat, would furnish the factory proprietors with a self-acting means of regulating the temperature of their apartments, and of promoting their ventilation.

(To be Continued.)

Agriculture, &c.

From the New-York Daily Express.

A CHAPTER ON PORK.

CINCINNATI, Dec. 31, 1836.

Some of the items I gave you in my letter of the 9th inst., on the subject of Pork, and particularly on the slaughtering, I had collected sometime since. Having visited the packing and slaughtering houses within the last day or two, I found additions and improvements had been made this year, I was not before aware of. I will therefore give you another letter on *Pork*, and go somewhat into particulars. Less is doing this winter in Pork, than was anticipated during the past summer. It was known that hogs were plenty throughout the country, and it was believed that the prices would consequently be low,—or lower than last year,—but the uncommonly high prices paid last winter, induced the drovers to scour the country and purchase all the hogs they could find, and on driving them to the city, they demanded what our packers thought an

exorbitant price—say for hogs weighing 200 to 250 pounds, $7,00 per hundred.,—the consequence was, that the packers generally delined purchasing, and the drovers would not sell for less, so that but few hogs were packed for the first three weeks of the season. In fact, up to this time, only about 50,000 hogs have been slaughtered, whereas two years ago, at the same time, more than 120,000 were slaughtered and packed. Some of our Pork Merchants are not packing at all, others are doing a little, and none to an extent of former years. Hogs, however, remain firm at the prices demanded by the drovers, and sales were made yesterday at $7 25 der hundred pounds, for hogs weighing 250 pounds. The pork season generally lasts about eight or ten weeks—last year it closed in less than eight weeks—in fact, but few hogs were slaughtered after the first of January. *Eighty thousand* was the number packed last winter. (In the publication of my letter of the 9th, by a typographical error, the number is set down at 60,000.) It is supposed that there will not be more packed in the city this winter than last, and about a half of the number of winter before last. Hogs are driven to this market from the interior of Ohio, Indiana and Kentucky. I will now give you the *modus operandi* of slaughtering, which is performed with such expedition at the slaughterting houses of *John W. Coleman, Esq.*, who has made a large fortune at this business. I find, on visiting these houses, which are situated on the north-east extremity of the corporation line, and bordering on a small stream called Deer Creek, or, as it would more properly be called at this season of the year, *Bloody Run*, that the number of slaughter houses now amount to *nine*, the largest of which is 160 feet long by 60 wide. The others average 100 feet long by 60 wide. Mr Coleman has also another slaughter house at Covington, on the Kentucky shore, which makes in all, *ten houses*. At *each* of these houses, he has now employed, 36 to 40 men,—making altogether, about *three hundred and eighty men*, to whom he pays $1,25 to $2,00 per day each. Near these houses are *pens* of various sizes, and covering altogether about forty acres of ground—into these pens are driven the different droves of hogs by their respective owners, as they come into the city, preparatory to the operation of slaughtering. These pens hold from 100 to 1000 each. In these slaughtering houses there are large kettles at each end, filled with water, which is kept constantly boiling, and the operation of killing, scalding, dressing, &c., goes on simultaneously at both ends of the several houses—the hogs are hung up in the centre to be dressed, before removing them to another part of the building to cool. Attached to each end of these houses is a small pen, that will hold about 50 to 60 hogs—into these pens the hogs are driven until they are so compact, that the *executioner* walks in on their backs' bearing in his hands a large sledge hammer, with with he "deals death and destruction" all around him. When they are all knocked down they are removed within the building where the knife is passed into the throat. After bleeding they are thrown into the kettle of water (one at a time) and thence, after sufficient scalding, removed to a bench, when the bristles are scraped off by iron scrapers, made expressly for the purpose, and thence hung up, when the "*gutter*," as he is called, passes his knife from one end of the hog to the other, and removes the offal, and completes the dressing; and so scientific have these *surgeons* become, that any one of them can complete the inside dressing, removing all within, washing out, &c., *of three hogs within the minute*—and, as I stated in my letter of the 9th—*each set of men, at each kettle and bench, at either of these houses, will knock down, bleed, scald, remove the bristles, and complete the inside dressing of fifty hogs within the hour*—which would be *one hundred hogs at each house*, or *one thousand* at all the 10 houses, in a SINGLE HOUR. I learn they now work about eight hours per day, and were it necessary—to such perfection has Mr. Coleman brought this science of "hog-killing"—that he could at this time, at his ten houses, slaughter, and have completely dressed and hung up to cool, EIGHT THOUSAND HOGS IN ONE DAY. I will venture to say, there is no place in the world, out of Cincinnati, where this can be done, *and here it* CAN *be done.* In past years, before Mr. Coleman had arrived at such perfection in the art, he has slaughtered, dressed, and hung up, in *four houses*, and some of them not in double operation, as now—*twenty-seven hundred in a day*—say 8 or 9 hours' work. The same ratio for *ten* houses, would make 6,750. Mr. Coleman has no competition in this line of business, and I am now informed, that the gut lard, soap grease and bristles (which is the only compensation for slaughtering) is worth about 50 cents for each hog—which would amount to *fifty thousand dollars* for slaughtering a hundred thousand hogs. No mean business, this—and all accomplished within 8 or 10 weeks.

When the hogs become cool, they are conveyed on large wagons made expressly for the purpose, to the packing-houses, which are the largest and most splendid warehouses in the city—there they are cut up and packed, the lard rendered and put in kegs, and the hams cured for smoking.

In the winter and spring of 1835, we exported about sixty thousand barrels of pork! and one hundred thousand kegs of lard! Last winter and spring we exported about half that quantity, and the winter and spring of 1837, we may possibly export more than last year, although it is somewhat doubtful. The quality of the hogs this year is better than they were last, and consequently more clear pork will be packed than then. There is so far a good demand for all the new pork and lard; sales have been made, and are now making, at the following prices:—clear pork $22; mess $20; prime $18; lard 12 cents. Two weeks since, sales were made at prices *ten per cent.* lower than these. These prices are higher than this time last year, and it is thought they will be maintained.

In the article of *Hams*, our pork merchants (those who turn their attention to it) furnish better hams than can be found in any other part of the country. I will venture the assertion, that the *sugar-hams* cured by William M. Walker, and Miller & Lee, cannot be surpassed in flavor and goodness of quality, generally, in the United States. I am aware that the Virginia hams are good. I am also aware, that the hams cured in or about Boston are good—very good—and there is a reason for it. The hogs are fed wholly on corn, the meat is solid, and the hogs are generally fat; but still they cannot match the *family hams* put up by Mr. Walker, and Miller & Lee, of this city—*they know how to cure them*—and that is the great secret, and a secret known but to few. Others of our pork merchants cure most excellent hams, and perhaps equal to any. I have not had an opportunity of knowing. One thing is certain, not only the hams but the pork and lard, exported from Cincinnati, stands high in the Southern and Eastern markets.

Having strung out this letter already to too great a length, I will close this chapter on pork. I may refer to the subject again in some future communication.

From the Encyclopedia of Agriculture.

CHARACTERISTICS OF FLEMISH HUSBANDRY.

To make a farm resemble a garden as nearly as possible, was their principal idea of husbandry. Such an excellent principle, at first setting out, led them, of course to undertake the culture of small estates only, which they kept free from weeds, continually turning the ground and manuring it plentifully and judiciously. Having thus brought the soil to a just degree of cleanliness, health and sweetness, they ventured chiefly upon the culture of the more delicate grasses, as the surest means of acquiring wealth in husbandry, upon a small scale, without the expense of keeping many draught horses or servants. After a few years experience, they soon found that ten acres of the best vegetables for feeding cattle, properly cultivated, would maintain a larger stock of grazing animals, than forty acres of common farm grass: and the vegetables they chiefly cultivated for this purpose were lucerne, sainfoin, trefoils of most denominations, sweet fenu-greek, (*Trigonelle*,) buck and cow wheat, (*Melampyrum pratense*,) field turnips and spurry, (*Spergula*) by them called marian-grass.

The political secret of Flemish husbandry was, the letting farms on improvement. Add to this, they discovered eight or ten new sorts of manures. They were the first among the moderns who ploughed in living crops, for the sake of fertilizing the earth, and confined their sheep at night in large sheds built on purpose, whose floor was covered with sand, or earth &c., which the shepherd carted away every morning to the compost dung hill. Such was the chief mystery of the Flemish husbandry.

Urine cisterns are formed in the fields, to receive purchased liquid manure; but for that made in the farm yard, generally in the yard, or under the stables. In the latter case, the urine is conducted from each stall to a common grating, through which it descends into the vault; from thence it is taken up by a pump. In the best regulated farmeries there is a partition in the cistern, with a valve to admit the contents of the first space into the

second, to be preserved there free, from the more recent acquisition, age adding considerably to its efficacy. This species of manure is relied on beyond any other, upon all the light soils throughout Flanders, and even upon the strong lands, (originally so rich as to preclude the necessity of manure) is now coming into great esteem, being considered applicable to most crops and to all the varieties of soils.

Fallows, according to Sir John Sinclair, are in a great measure abolished, even on strong land; by means of which, produce is increased, and the expense of cultivation on the crops raised in the course of a rotation, necessarily diminished; and by the great profit they derive from their flax and rape, or coleseed, they can afford to sell all their crops of grain at a lower rate. Notwithstanding this assertion of Sir John, it will be found that a fallow enters into the rotation on all of the clayey soils Flanders.

Flax is cultivated with the utmost care The field intended for this crop, after two or three ploughings and harrowings; is again ploughed, commencing in the centre and ploughed round and round to the circumference, so as to leave it without any furrow. The heavy roller is drawn across the ploughing by three horses; the liquid manure is then spread equally over the entire surface, and when well harowed in, by eight or nine strokes with the harrow, the seed is sown, which is also harrowed in by a light harrow with wooden pins, of less than three inches; and the surface to conclude the operation, is again carefully rolled.

Nothing can exceed the smoothness and cultivated appearance of fields thus accurately prepared.

The manure universally used for the flax crop demands particular notice. It is termed liquid manure, and consists of the urine of cattle in which rape cake has been dessolved, and in which the *vidanges* conveyed from the privies of the adjoining towns and villages, have also been blended. This manure is gradually collected in subterraneous vaults of brick work, at the verge of the farm next to the main road. Those receptacles are generally forty feet long by fourteen wide, and seven or eight feet deep; and in some cases are contrived with the crown of the arch so much below the surface of the ground, as to admit the plough to work over it. An aperture is left in the side, through which the manure is received from the cart by means of a shoot or trough, and at one end an opening is left to bring it up again, by means of a temporary pump which delivers it either into carts or tonneaus.

The liquid is carried to the field in sheets or barrels, according to the distance. Where the cart plies, the manure is carried in a great sheet called a *voile*, closed at the corners by running strings, and secured to the four uprights of the carts; two men standing one on each side of the cart, scatter it with hollow shovels upon the rolled ground; or where the tonneaous are made use of, each is carried by two men with poles, and set down at equal intervals across the field, in the line of the rolling.

There are two sets of vessels, which enable the men who deposite the loaded ones, to bring back the others empty. One man to each vessel, with a scoop or rather a kind of bowl with a long handle, spreads the manure so as to cover a certain space; and thus by preserving the intervals correctly, they can precisely guage the quantity for a given extent of surface. For the flax crop, they are profuse, and of this liquid mixture, in this part of the country, they usually allow at the rate of 2480 gallons, beer measure, to the English acre.

With culinary vegetables the Flemish markets are abundantly supplied. Most of these are grown by the small farmers, and are of excellent quality. To every cottage in Flanders a garden of some description is attached; and according to the means, the leisure, and the skill of the possessor, is rendered more or less productive.

The general principles of management with all are, frequent digging, careful weeding, ample manuring, and immediate succession. The rotation depends on circumstances. The cheif vegetables in common use are parsnip, carrot, turnip, scorzonera, savoy, jettechou, cabbage, (Brussels sprouts) onions leeks, pease, beans, and all kinds of salading, with another vegetable called *fene haricot*, a large species of French bean, which has a place in the field or garden of almost every farmer; and being sliced down, pod and seed, is made a chief ingredient in all farm-house cookery.

The treatment of asparagus here, and generally in Flanders, differs considerably from our method: in forming their beds, they are not by any means particular as to very deep trenching, or a profusion of manure; nor, as they grow up, do they cover the beds with litter for the winter, nor fork and dress them in the spring; in the furrows they form a rich and mellow compost of earth and dung, with which before winter sets in, they dress up their beds to the height of nearly eighteen inches from the level of their crowns, and without any further operation, (except supplying the furrows again for the ensuing year,) as soon as the buds appear, they cut them 9 inches under the surface; by which means, having just reached the light, the whole of the stock is blanched and tender.

Every substance that constitutes, or is convertible to manure is sought after with avidity, which accounts for the extreme cleanliness of the Flemish towns and pavements, hourly resorted to with brooms and barrows, as a source of profit. Even the chips which accumulate in the formation of shoes worn by the peasantry, are made to constitute a part of the compost dung heap; and trees are frequently cultivated in barren lands, merely to remain till their deciduous leaves shall in the course of time, have formed an artificial surface for the purpose of cultivation. The manures in general use are—

The farm-yard dung, which is a mixture of every matter that the farm yard produces, formed into a compost, which consists of dung and litter from the stables, chaff, sweepings, straw, sludge, and rubbish, all collected into a hollow part of the yard, *so prepared as to prevent the juices from being wasted*; and the value of this, by the cart load of 1500 lbs. of Ghent, is estimated at five franks.

The dung of sheep, pigeons or poultry, by the cart load, five franks and a half.

Sweepings of the streets and roads, same quantity, three francs.

Ashes of peat and wood mixed, same quantity, eight francs.

Privy manure, and urine, same quantity, seven francs.

Lime, same quantity, twenty-four francs.

Rape cake, per hundred cakes, fifteen francs.

Gypsum, sea mud, and the sediments of canals, have been all tried experimentally, and with fair results; but the two former have been merely tried; the latter is used successfully in the vicinity of Burges.

Bone manure was altogether unknown in Flanders, but at the suggestion of Radcliff, is now under experiment in that country.

From the Southern Agriculturist.

STRAWBERRIES.

Charleston Neck.

Mr. Editor,—In a former number of your useful journal, I read an interesting article on the cultivation of the Strawberry. Too much attention cannot be paid to this delightful fruit; and, concerning the income which an acre or two will yield, if planted in strawberries, I can, along with yourself, bear the most decided testimony.

For the last five or six years, I have been raising this fruit, upon my farm; and never fail to sell it, at from 25 cents to 50 cents per saucer. If the beds are properly attended, bushels of the berries might be raised, and as readily sold at the above prices.

I shall not enter into an enumeration of the various species of these berries. In a former number of your journal, among the selected articles, will be found, very full information upon the subject. It will be there found, that they are as various in their kinds as any other fruit. Much praise is due to our horticulturists, for their zealous endeavours to introduce the various species of the strawberry into our State. The great success they have met with in this respect, has been more than once evinced by the brilliant and luscious display of this fruit by our Horticultural Society, within the last several years. At its last exhibition, among the other beautiful and delicate varieties exhibited, was one from the garden of Jonathan Lucas, Esq. The fruit measured several inches round, and had every indication of being as exquisite in flavor as it was agreeable in size.

For my own use, I have cultivated the common strawberry of our climate. By care and attention in its cultivation, I am fully persueded, that it may be rendered more productive than any other, and full large enough to gratify the keenest appetite.—However, like all other fruit, the larger the strawberry is made to grow, the coarser does it become to the taste.

I have unconsciously entered into this long preface, Mr. Editor, when my object was, to offer some practical hints to your readers, upon the cultivation of this delicious fruit.

In the article from your pen, to which I have already alluded, you recommend the

burning of the strawberry beds, early in March, or during the latter part of February. I prefer doing this at an earlier perior, and you shall have my method.

During the month of December, I lay pine trash, or other combustible matter, over my strawberry beds, and selecting a dry day for the purpose, I set fire to the entire mass.—As the trash burns, it will ignite along with the dry plants, the old decayed leaves of the strawberries, and consume all the old useless suckers.

Immediately after doing this, if your strawberries have grown up the previous year broad-cast, or, as I should otherwise express it, if their suckers have been suffered to take root all over the bed, you should hoe the bed just burnt, in trenches about ten or twelve inches apart, transversely on the bed. After this, well-rotted manure should be scattered in the trenches, and the whole bed should then be covered over with straw or chaff. Tanner's bark will do, if you cannot readily procure the straw or chaff.

The manure, applied as above, will warm the plants, and give them early maturity in the spring.

As soon as the plants shoot forth, the alleys between them should be well stirred, and kept free from all kinds of weeds.

A friend of mine, from the country, tells me, that he has applied cotton seed, with the greatest success, as a manure for strawberries. He applied it in the same way as I recommend the compost to be applied.

I must, however, state here, that no treatment will make strawberries produce well, without transplanting every three or four years. Bearing this in mind, it will be well if we have any plants which are as old as above stated, to transplant during this month. I confess it would have been much better to have done so during the previous month, but having neglected to do so then, it is not too late now.

The plants should be carefully selected, and set out upon a well-manured bed, about ten or twelve inches apart each way. As soon as the plants take, they should be treated as I have already directed.

I remain, Mr. Editor, your obt. servt.

P. J.

From the Farmer and Gardener.

We find the following communication marked for our eye in the *Germantown Telegraph*, and as the writer seems to question the fact which we published some weeks since, of 1510 bushels of Ruta Baga having been raised on an acre of ground, we will remark, that although we do not *vouch* for all that appears in our columns, we endeavor so far to exercise the right of censorship as to preclude that which we believe is calculated to lead our agricultural brethren into error.

That the *named quantity* of Ruta Baga, viz: 1510 bushels has, and can again be raised from an acre we have no doubt. It is known to every one acquainted with the culture of this excellent root, that in England, as well as in this country, products equally as large have been repeatedly raised. On a small scale, it appears from the statement of the *Germantown Farmer*, that he raised of the common turnip, planted in drills two feet apart, by 6 inches, at the rate of 500 bushels to the acre. These turnips would have grown equally as well if the rows had been but 12 inches apart, and consequently would have yielded just twice the quantity. And on good ground, well manured with thoroughly rotted dung, rich mould, or a compost of cow-dung and ashes, the plants might with advantage have been brought to stand 8 inches apart, that is, the rows eight inches apart, and the plants the same distance, which we think would have given the quantity stated, provided the turnips had been planted in due time, hand hoed, and well protected from weeds. What the precise quantity would be, we, however, leave the "*Germantown Farmer*" to calculate. And should he discover that the yield would be more than the stated quantity, we take it for granted, he would admit that, as the Ruta Baga grows larger, it necessarily must yield more than the common turnip, and especially as from its irregular form, it *measures more*. Those who advocate the drill husbandry for turnips generally recommend that the rows should be one foot apart and the plants the same distance from each other;—now this would give us 43,560 turnips on an acre; and for the information of our Germantown Farmer, we would remark, that we measured and counted a bushel of the turnips raised by us the present season on Friday last, which, owing to being sowed late, and on ground not at all manured, were but of medium size. The bushel contained 45 turnips, which if they had stood a foot apart would give to the acre 968 bushels. Our crop did not yield at this rate; for owing to drought when the seed was sown, there were as many, if not more *bald* than covered places in our patch, and from this cause our yield was not above 250 bushels to the acre: and although but *half that* of the *Germantown Farmer*, and the *third* of the yield of the grower of the Ruta Baga, we rejoice in our heart others had been more successful than ourself; felt no disposition to "question the correctness" of the statements of those who had been more fortunate than we had, and, of course, gave ourself no trouble in speculating, whether a cypher had been added or not, for although we have grown too old to believe all we read, or to give in to every fashionable dogma, or crude notion, that these eventful days are hourly brining forth, we have too much respect for the social duties of man, as well as for the the courtesies of life, to question the averments of our neighbors upon slight grounds believing as we do, that the *questioning* of the veracity of another is one of the most impertinent as well as unpardonable offence, which one man can commit against his fellow creature. *Truth* as we have said upon another occasion, we hold as the basis of every other virtue, and, therefore, hold its opposite in utter abhorrence, and while we shall entertain sufficient respect for ourself to cultivate virtue and despise vice, we shall certainly expect courtesy at the hands of others.

Near Germantown, 8th Dec., 1836.

To the Editor of the Telegraph:—

I have been pleased with the articles on farming and agriculture that you extract and select from various sources; but while we have the good manners to listen to their wonderful stories, let us not forget that we have a right to have a say in the matter too; and I am surprised that our fellow townsmen have not sounded their own trumpets on this subject: let me set them an example, and show that we can raise turnips as well as the Baltimoreans.

On the 17th of August last I dug over two rods of ground on which I had raised early peas aad onions, (manuring the part where the peas had stood, but not heavily; the onion land had been manured previous to planting the onions,) and sowed or dibbled the flat blue topped turnip seed in two rows two feet apart and six inches apart in the row. I flat hoed them twice, I believe, afterwards; thinned them out to single plants in due time, and kept them clear of weeds. They grew finely and completely covered the land thick with their tops. I took them in on the 2d of November last, and had more than six bushels of turnips on these two rods of ground. This is at the rate of 500 bushels to the acre for a ten week's crop, but not 1510 bushels certainly. I am inclined to question the correctness of this Baltimorean story; for mine stood as thick as they could well stand on the ground and were quite as large or larger than any Ruta Baga that I have seen in this country. There is a mistake in it to a certainty; for it does not give four square yards of land to each bushel of turnips; and to have them fine they should be grown in rows three feet apart, and a foot apart in the row. This would give twelve turnips in the four square yards, and these must more than fill a bushel, to have 1510 bushels on an acre of land. It looks a little incredible; perhaps a cypher has been tagged to the story; a nothing in itself; but something wonderful when used in union with 151. Soliciting proof and evidence of this astonishing turnip crop.

I am, Sir,

Yours respectfully.

A GERMANTOWN FARMER.

Advertisements.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIV c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
250 tons	2½	by	½,	15 ft in length, weighing		4 63/100	per ft.
280 "	2	"	½,	"	"	3 50/100	"
70 "	1½	"	½,	"	"	2½	"
80 "	1½	"	½,	"	"	1 25/100	"
90 "	1	"	½,	"	"	½	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28-tf Philadelphia, No. 4, South Front st.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

1st month, 7th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tililson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long
Rochester, May 22d, 1836. 19y-tf.

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.
Troy Iron Works, Nov. 15, 1836. 7—tf

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.
BOSTON, April 26th, 1836. NO. 1—6t.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—vtf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO CONTRACTORS

STONE CUTTERS and MASONS.

JAMES RIVER and KANAWHA CANAL.—Contractors for mechanical work are hereby informed that a large amount of Masonry, consisting of Locks, Culverts, and Aqueducts, is yet to be let on the line of the James and Kanawha Canal.

Persons desirous of obtaining such work, and prepared to exhibit proper testimonials of their ability to execute it, will apply at the office of the subscriber in the city of Richmond.

Stone Cutters and Masons wishing employment in the South during the winter months, may count with certainty on receiving liberal wages, by engaging with the contractors on the work

CHAS. ELLET, Jr., Chief Eng. J. R. & K. Co.
Richmond, Nov. 29, 1836. 51—6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

NOTICE TO CONTRACTORS.

Proposals will be received at the office of the Hudson and Berkshire Railroad Company, in the city of Hudson, until the 15th of January, 1837, for One Million feet, board measure, of Southern pine, of the following dimensions:—6 inches square, and in lengths of 21, 24, 27, and 30 feet long—also, for 14,000 Chestnut or Cedar ties, 8 feet long, and 6 inches square—and also, 4,000 sills, of Hemlock, Chestnut, or White Pine, 4 by 10 inches, and in lengths of 15, 18, and 21 feet long. The whole to be delivered by the 1st day of July, 1837.

GEORGE RICH.
Engineer.
Hudson, Dec. 22, 1836. 52 4t